

011-2-30123
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FIG. 1A

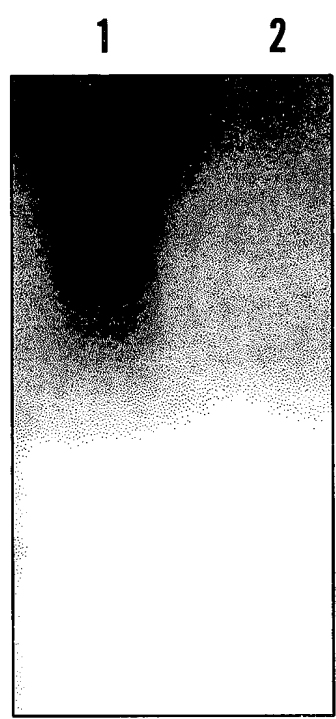


FIG. 1B

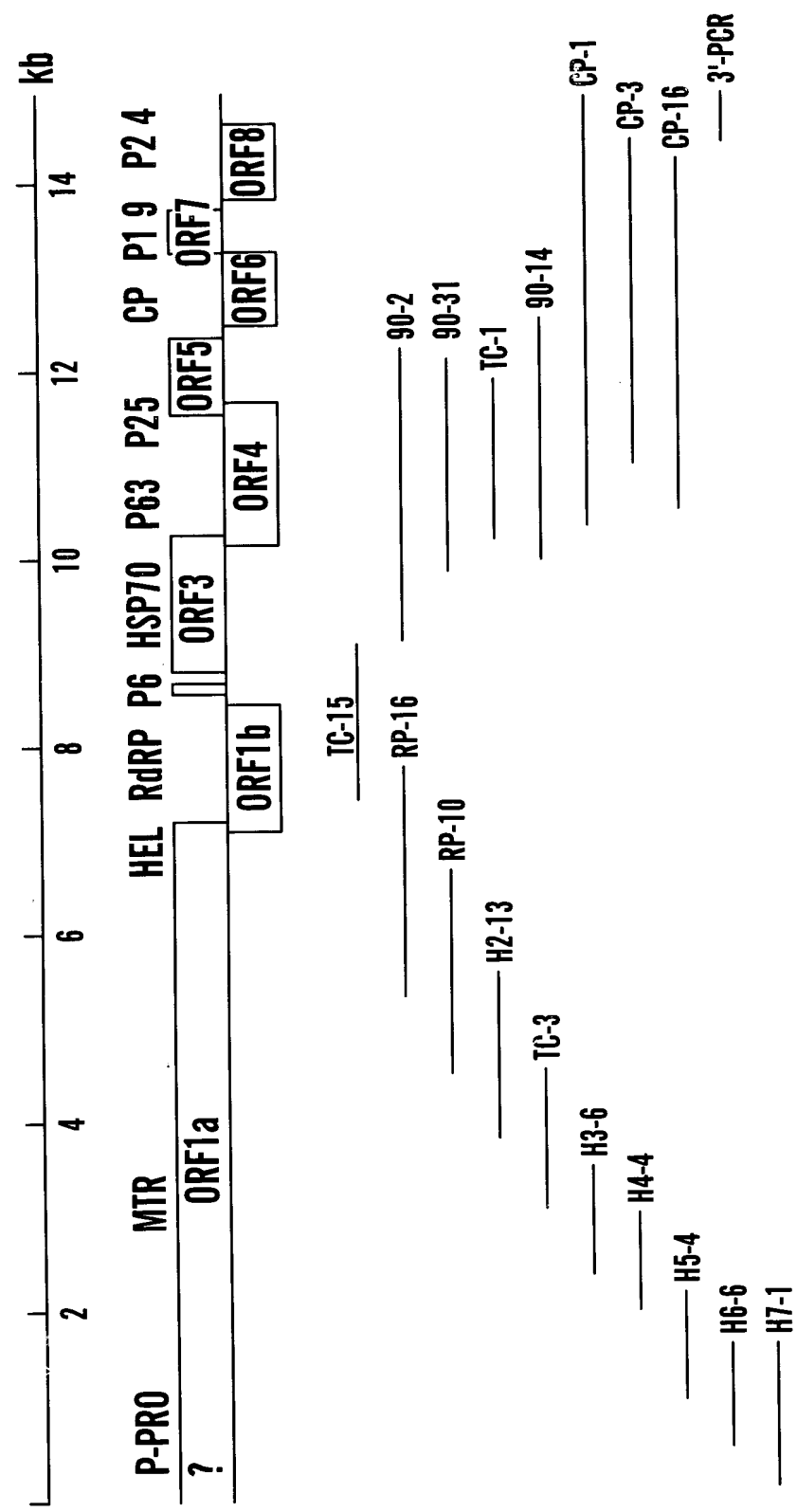


FIG. 2

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GLRaV2-PRO₁ SRVIYPDGRCLAHMRYLCAFYCRPFRESYALGMWPTVARLRACVEKNFGVEACGIALRGYITSRNVYHCDYDSAYVKYFRNLSGRIG/G
GLRaV2-PRO₂ TRIRYPNGFCYLACHRYACAFLLRGFDPKRFDIGAPPTAAKLNRNMVSELGERSLGLNLYGAYTSRGVHFCHDYDAKFIKDLRLMSAVIA/G
BYV-P-PRO LQYRPGEGLCYLAHAALCCALQKRTFREEDFFVGMYPFKFVFAKRLTEKLGPSALKHPVRGRQVSRSLFHCDDVASAFSSPFYSLPRFIG/G
ConsensusG.CYLAH....CA...R.F.....G..PT.....G.....G...SR...HCD.....I./G

FIG. 3A

	<u>MT I</u>	<u>MT Ia</u>	<u>MT II</u>
GLRaV2-MTR	MSEATQNSLTRFPYQFELKFSHSSHDHPAAASRLLENETLVRLCGNSVSDIGGCPLFHLHSTQRRVHVCRPVLGDKDAQRRVVDLQ		
BYV-MTR	MGEAVQSGLTRAYPQFNLSFTHSVSDHPAAAGSRLLENETLASHAKSSPSDIGGCPLPHIK-RGSTDYHVCRIYDMKDAQRRVSRELQ		
	<u>MT IIa</u>	<u>MT III</u>	
GLRaV2-MTR	YSNVRLG-DDDKILEGPRNIDICHYPLGACDHESSAMMVQYDASLYEICGAMIKKKSRTITYLTWVTPGEFLDGRCEVYMESLDCEIEV		
BYV-MTR	ARGLVENLSREQLVEAQRVSVCPTHGNCNVKSDVLINQVYDASLNEIASAMVLKESKVAYLTWVTPGELLDEREAFIDALGCDVWV		
	<u>MT IV</u>		
GLRaV2-MTR	DVHADVVMYKFGSSCYSHKLSIIKDINTPYLTGLGFLFSVEMYEVRMGVNYFKITKSEVSPSISCTKLLRYRRANSDDVVKLPRFD		
BYV-MTR	DTRRDMVQYKFGSSCYCHKLSNIKSIMLTPTAFTSGNLSFSEMYENRMGVNYKITRSAYSPEIRGVKTLRYRRACTEVVQVKLPRFD		

FIG. 3B

	<u>HEL I</u>	<u>HEL Ia</u>
GLRaV2-Hel	FVFTNSSVDILLYEAPPGGGKTTTLIDSFLKVFKKGEVSTWILTANKSSQVEILKKVEKEVSNIECQKRKDKRSPKKSIIYTDAYLMHHR	
BYV-Hel	FTFTNLSANVLLYEAPPGGGKTTTLIKVFCETFSK--VNSLILTANKSSREEILAKVNRIVLD-EGDTPLQTRDR---ILTIDSYLMNHR	
	<u>HEL II</u>	<u>HEL III</u>
GLRaV2-Hel	GCDADVLFDIECFMVHAGSVLACIEFTTRCHKVMIFGDSRQIHYYIERNELDKCLYGDLDLRFVDLQCRVYGNISYRCPWDVCWALSTVYGNL	
BYV-Hel	GLTCKVLYLDECFMVHAGAAVACIEFTKCDTAILFGDSRQIRYGRCELDTAVLSDLNRFVDDESRYGEVSYRCPWDVCWALSTFYPKT	
		<u>HEL IV</u>
GLRaV2-Hel	IATVKGESEGGSSMRINEINSVDDLVPDVGSTFLCMLQSEKLEISKHF---IRKGLTKLNVLTVHEAQGETYARVNLVRLKFQEDPEPKS	
BYV-Hel	VATTNLVSAGQSSMQVREIESVDDVEYSSEFVYLTMLQSEKDLLKLSFGKRSRSSVEKPTVLTVHEAQGETYRKVNLVVRTKFQEDDPFRS	
	<u>HEL V</u>	
GLRaV2-Hel	IATVKGESEGGSSMRINEINSVDDLVPDVGSTFLCMLQSEKLEISKHF---IRKGLTKLNVLTVHEAQGETYARVNLVRLKFQEDPEPKS	
BYV-Hel	VATTNLVSAGQSSMQVREIESVDDVEYSSEFVYLTMLQSEKDLLKLSFGKRSRSSVEKPTVLTVHEAQGETYRKVNLVVRTKFQEDDPFRS	
	<u>HEL VI</u>	
GLRaV2-Hel	IRHITVALSRHTDSLTYNVLAARRGDATCDAIQKAAELVNKFRVFTSFGGS	
BYV-Hel	ENHITVALSRHVESLTYSVLSSKRDDAIAQAIVKAKQLVDAYRVYPTSFSGGS	

FIG. 3C

	<u>RdRP I</u>	<u>RdRP II</u>	<u>RdRP III</u>
GLRaV2-RdRP	ICRFKLMVKRDAKVKLDSSCLTKHSAAQNMIFHRKSINAIFSPIFNEVKNRIMCCLKPNIKPFTEMTNRDFASVVSNNMLGDDDDVYHIGEV		
BYV-RdRP	ITTFKLMVKRDAKVKLDSSCLVKHPAQAQNMIFHRKAVNAIFSPCFDEFKNRIVITCTNSNIVFFTEMTNSTLASIAKEMLGSEHVYNVGEI		
	<u>RdRP IV</u>	<u>RdRP V</u>	
GLRaV2-RdRP	DFS KYDKSQDAFVKAFEEVMYKELGVDEELLAIMWCGERLSIANTLDGQLSFTIENQRKSGASNTWIGNSLVTGLILSLYYDVRNFEALY		
BYV-RdRP	DFS KYDKSQDAFVKAFEEVMYKELGVDEELLAIMWCGERLSIANTLDGQLSFTIENQRKSGASNTWIGNSIETGLILSMFYTTNRFKALF		
	<u>RdRP VI</u>	<u>RdRP VII</u>	<u>RdRP VIII</u>
GLRaV2-RdRP	ISGDDSLIFSRSEISNYADDICTDMGFETKFMSPVYPFCSKFVVMCGHKTFFVDPYKLVKLGAVKEDVSMDFLFETFTSFKDLTSDF		
BYV-RdRP	VSGDDSLIFSESPIRNSADAMCTELGFETKFLTPSVYPFCSKFVVMCGHKTFFVDPYKLVKLGASKEDVDEFLFEVFTSFRDLTKDL		
GLRaV2-RdRP	NDERLIQKLAELVALKYEVQTGNTTLAL		
BYV-RdRP	VDERVIELLTHLVHSGYGYESGDTYAAAL		

FIG. 3D



GLRaV-2	CAUGAUAAGCAGGUGUU <u>UAGCG</u> UAGUUCGGUCCAGGCGAUUCCGCGUAGA
BYV	CACGACCCGCGAGCGGUU <u>UAGCT</u> OGAUUCGCUCCAGGCGAUUCCUAAGAGG
BYSV	CACGAUACACAGCGGUGUU <u>UAGCG</u> UAGUAGGUCCAGGCGAUCCCUAAAAGG
CTV	CACGAACCGCGUCCGCGU <u>UCCGCG</u> UAGUAAGGUCACAAGCAAUCCUCCAAGA
Consensus	CA.GA.....CG.GUU..GC....U....UC.CA.GC.AU.CC....AG.

FIG. 4A

GLRaV-2	H D K Q R V <u>S</u> V V R S Q A I P R R
BYV	H D P Q R V <u>S</u> S I R S Q A I P K R
BYSV	H D E Q R V <u>S</u> V V R S Q A I P K R
CTV	H E P A R V <u>G</u> V V R S Q A I P P R
Consensus	H . . . R V . . . R S Q A I P . R

FIG. 4B



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GLRaV2-HSP70	MAVFGLDFGTFSTVGVKGRVFSFAQNSAVPTVLMVLSFSDNMFGEAESLMSNLKVGSFYRDLKRWGCDSSNLDAVILRLKP
BYV-HSP70	MAVFGLDFGTFSTVGVKGRVFSFAQNSAVPTVLMVLSFSDNMFGEAESLMSNLKVGSFYRDLKRWGCDSSNLDAVILRLKP
GLRaV2-HSP70	HYSVRVLKICGSELNETVSGNFGGVKSEHLFGLIALFIKAVISCABEAFACITGVICSVPANYDSVQRNFIDQCVSLSGGYQCVMIN
BYV-HSP70	HYKIELLKVAQSSKSTVKLDCYSGIVPQVATLFGILATFVKALISTASEAFKQCTGVICSVPANYNCLQRSFTESCYNLSGGYPCVYMN
GLRaV2-HSP70	EPSAALSAONSIGKKSANLAVYDFCGGTFDLSISYRNVFVWRASGELNLCGRVDRAFTHLFSUTSLEPLJITLDSNLKESLSKT
BYV-HSP70	EPSAALSAONSIGKKSANLAVYDFCGGTFDLSISYRNVFVWRASGELNLCGRVDRAFTHLFSUTSLEPLJITLDSNLKESLSKT
GLRaV2-HSP70	DAETVYTLRGVDCRKEDVRNNKNTLSVMLPYNRTIKLLESLKSYAKSWESARVKODLVLLGGSSVLPGLADVLKHHQSVDRLKVS
BYV-HSP70	VSEFLNFPWSEQGVVDVLANVSELAEVAAPFVERTIKIVKEVYKCSSMRLEPNWKAKLLMGGSSVLPGLLSRLSSIPFVDECLVLP
GLRaV2-HSP70	DEPRAAVGICALYSSCLSGSGGLLLIDCAHTVATADRSCHQLICAPAGPIPFSGSMFLYLAKWNKSQREVAVFEGEYVKCFKPKIC
BYV-HSP70	DARAAGCCALYSACLNDSPMLLVDCAHNLSTSSKCESIVCPAGSPIPTGVRTVMGTGSAVYSAALFEGDFVKCRUNKRIF
GLRaV2-HSP70	GANIRFFDIGVTGDSVAPVTFYMDFSISSVCAVSFWRGPEKQVSLGTAPWNFSSVALGSRSVRELHISLNKVFGLJLHKKADRLI
BYV-HSP70	FGDWLGNVGTGSAIRIVFLITLEINWSSVGTISFSLNGPTG/KKLIGGNAVDFSSVQLGERWADLHKHNSDKVKLTHALTYQFFQKK
GLRaV2-HSP70	LFTKDEAIRVADSI--DIADVLKEYSYAASALPPDEVMELLGKSVQVLRGSRLEEIPL.
BYV-HSP70	KLIDCEKALFLKRLTADYRREARKFSYDDAVL---NSSELLGRLLIPKILAGSRVEKLD-V

FIG. 5



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GLRaV2-CP M-----ELMSDN-----L-----SNLVTD-----ASSINGVKKLLSAEVEKMLVK--GARVE
GLRaV2-CPd M--SSNTSVFVQGLEALENSGWLITR--KEAVDKF-----FNEIKNENYSSVDSRUSSEKVE/LEKSESEK--SELASTIDE
BW-CP MCSAEP-----ISA-----IATFENSLAD-----QTLCHSDCKLRKAFEECLK--GVFED
BW-CPd MLAPFARGLLIH-----FTENTRDMETF-----FNSYDLAESENNKUNKEITDELGVTRERK--SELVTIDE
BISV-CP MAGND-----BSSDSSASQITAKD-----MTPAFENEPAS-----ATCINGENKKKLFEEFSVRUKIQ--DVYES
BISV-CPd M--PPQPGAE/VEHNAKSSLEVFSSREKVKGF-----FNFHKKTKQNNLNEDELREVLGKLKTELK--TINIKALDE
CIV-CP MDEIKKLNKKEIKEDWAAESSFSVN-----IHDP--TLITND-----VRQSLSTQQNALNRDLFLITLKGKHNLPK
CIV-CPd M--AGTVLFPKIDKEMDFSAVFGKVPD/TEKFNARSVDALIEGVTSKIDNSTYEDSTETFGTEHILKVMVMDTFL--ENYKTKIE
Consensus M.....

GLRaV2-CP GLEWFGILLYALAAKTTSEKIQRAEDSVFNSRGE--RNWVTEEDLKVLDSCAPLIRFTNGLRITGRITFENYVDFC IAKKHQLQL
GLRaV2-CPd HFVWHIIRFELIRCAKISTSEKVKY--VGSH--TWVDEKTVTVLIDWVNMMSLITKKYRVAQLRACACCEILYLIVAPTMSBEFKT-
BW-CP NLGIALGLCLYSCATIGTSKVNQPISTFKASFGGKELXJHGEINSFLGSKLLEKPNLRCFCRIFQKQYISLRKEXRGKLPPI
BW-CPd IFVRLAFALIRANUTTSKVN--VGAY--EYTIQKFL/KDWVFP/LEKCMKKFNKPNVRITCAITFEDAYIVTARSLPKLFIN-
BISV-CP GIPITLQMLYALATISSTSKIDIEKTPLASAKIDAN--VTITVEDINNFAISLITLKNVKNGLRVEARIFEEXLEVRVQYKHLENI
BISV-CPd DTYHVAFFLIRASVASTSEKVEI--HGSY--SYSLDRKTVNDWIFPQKILASKHKNLRAFCASLEBGMLSVARLGPDAFGT-
CIV-CP IKDERIAMLVRLAVKSSSQIDDAIGITYTR--EVEVLSEKLWIDWVNSKGIQNRITNALRWGRINDALYLAFCRQRNRN--LSIG
CIV-CPd ILIHLITMQLKLYTISTIKTKERDAGCI--SWQGLRKLKLVKVPFLISKFIDRETENALRKEACITFEELHLOWARLRLPYEN-
ConsensusS.....N.R.....

GLRaV2-CP NNADELGI PADSVLAADFL-GICEKLSLEIQSKWFAWALKTIEGGWNTP--VSNLRQLGRR--EVM
GLRaV2-CPd KAVGKGLFVCKEYLGADFLSGTISKMSIDHRANSIVAAKNAVPSAFICGERKIVSLYILGR--Y
BW-CP ARANKGLPADHYLAADFL-STSTELTDLQQSR-ILLAREVATHIEFSSSP--VISLAKQLGREGNCR
BW-CPd RTIGRGIPSGYEFGLADFLTATSCLNDHEKAVIQASRAAIDRAVSSSVGCKIVSLFLIGRL--S
BISV-CP ARANKGIPADSVLAADFL-QTSNLKEHQAV-LLERVAATASSGTIRES--ANILKVLG--QSSK
BISV-CPd RSVGKRGAPSGSEYLGADFLTSTCELMSDHRAVALSARVALPSAASQIDKMSLYDFGKWWYT
CIV-CP GRPLDAGIPAGHYLAADFL--TCAGLTLE--CAVTQAKQQLKRRGADVV-VINVRQLGKF--NTR
CIV-CPd KRTTRAGTHLKGVLGADFLSGSLPGYSHERGILIRASEMLARQGYEATELNLPLGK--YL
ConsensusG.P.....L.ADF.....G.....

FIG. 6A



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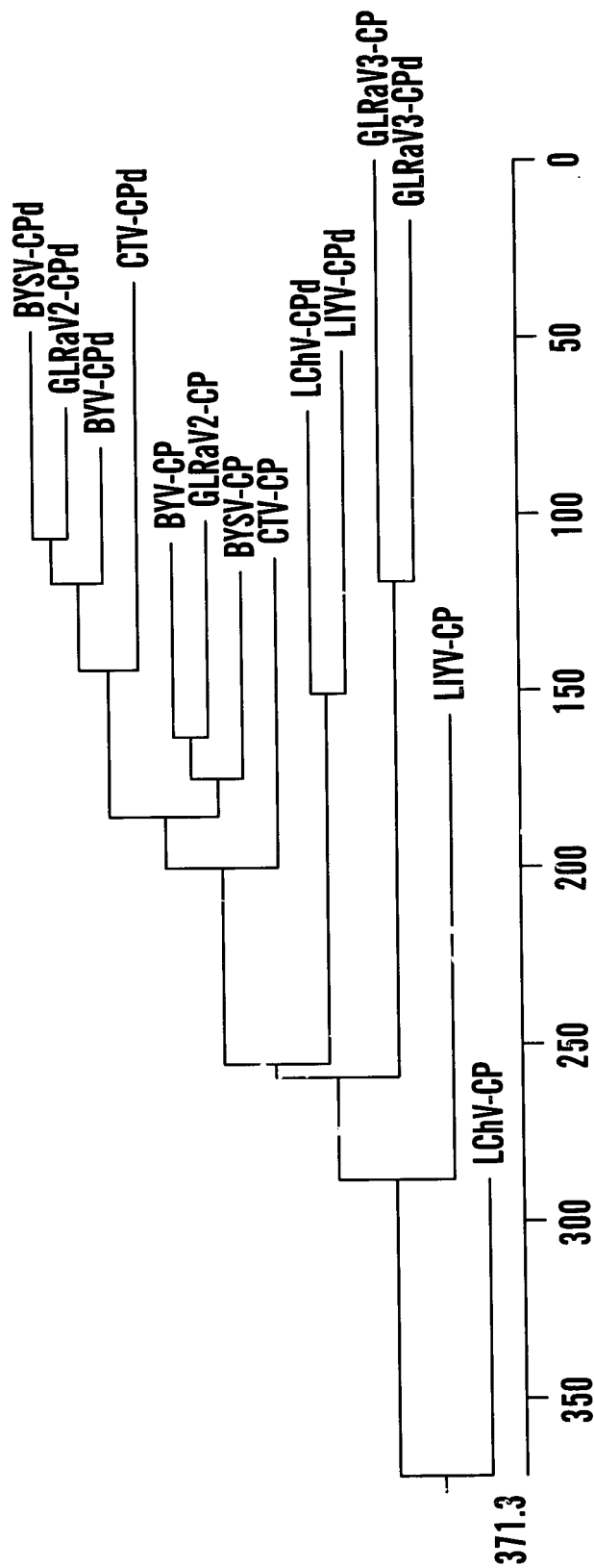


FIG. 6B

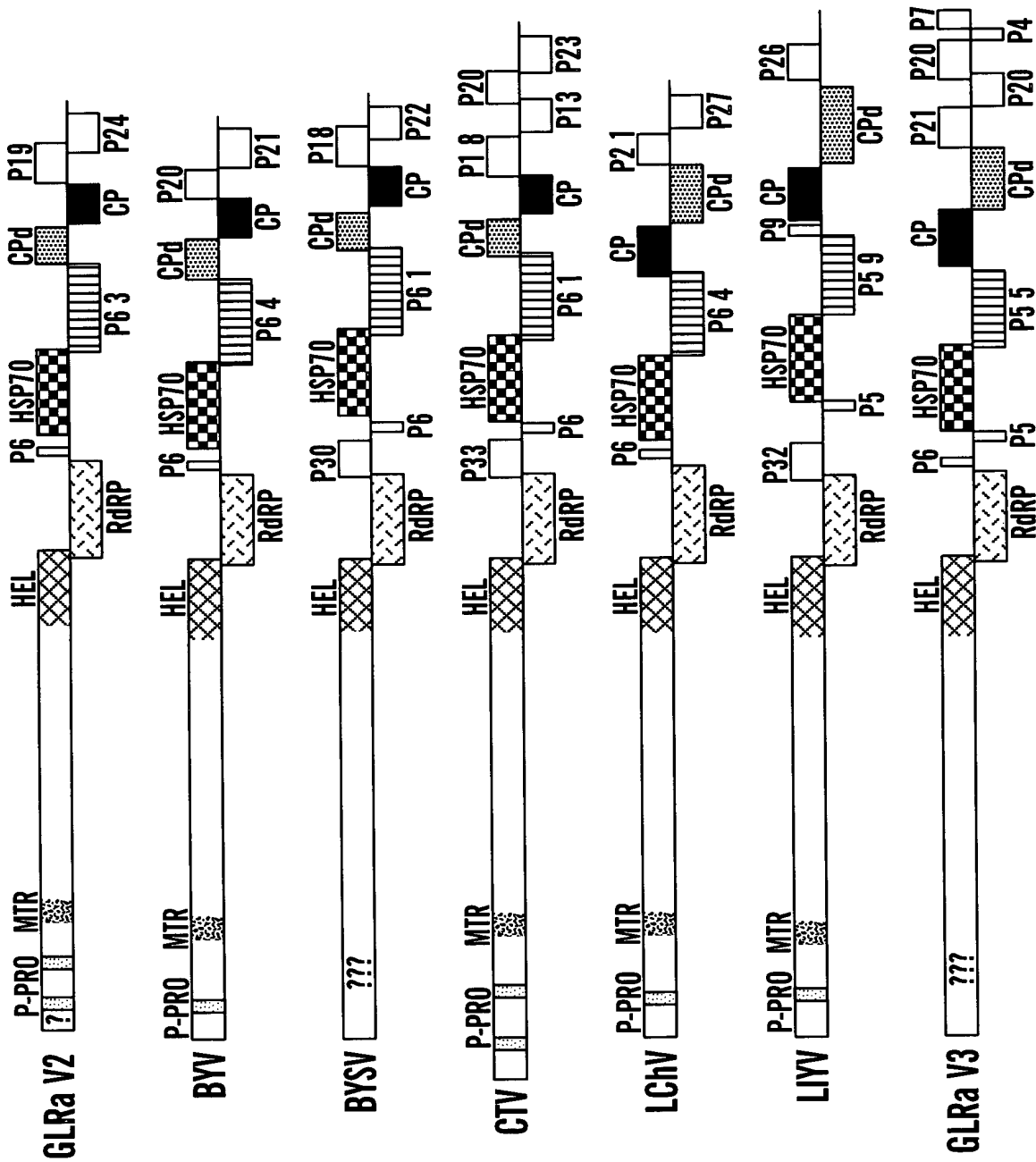


FIG. 7



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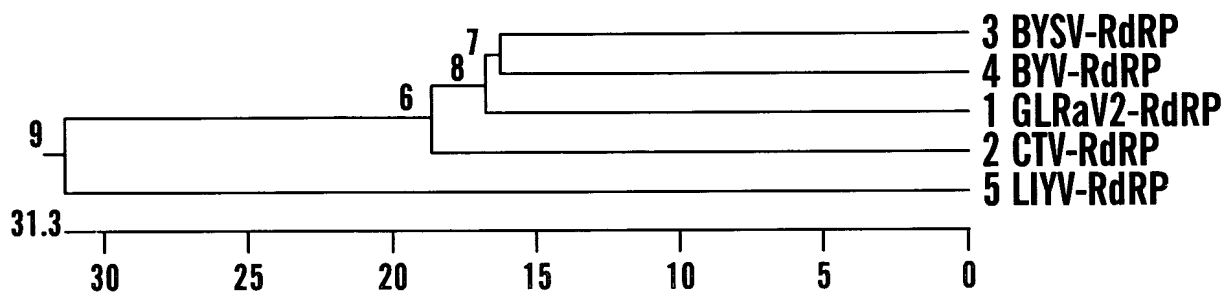


FIG. 8

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FIG. 9

GLRaV2-HSp90 MS-----NYSWESLFKKFYGEADWKKYLSRSIAAHSSEIKTLPDIRLYGGRVVKKSEFESALP
BYV-HSP90 MTTRFSTPANYWGLFRRFFGGQEWKMLMSEAAVSRRPYSS--DFRFSBGVILSRKTFGESTG
BYSV-HSP90 MSRR--PTFAGYSWGLFRRHYGEPEWKSYLETETSMKYKPLKSE--SITFYDGSSSLTSAELRPARS
CTV-HSP90 MSSH-----HVWGLFRKFYGEAIWKEYLSESTRNFDERNVSL--DHTLSSGVVVRQSLNAPQ
Consensus M.....W..LF....G...WK.....G.....

GLRaV2-HSp90 NSFEQE--LGLFILSEREVGWS-KLCGITVEEAAAYDLTNPKAYKFTAETCSPDVKGEGQKYSMED
BYV-HSP90 ESFVREFSL-LLTFPKTYE--VCKLCGVAMELALNGMNLSDYN-VSEFNIVDVKTGCKFNISQS
BYSV-HSP90 GT--AEYEIALLIIFSITKWSEKL-ERSIYRGLNQINNHSIYA-ETELEVTDVKTIGCKFTISA
CTV-HSP90 GTFENE--LALLYNSVVINDFVE-LTGMPKSLMTGIEDRKV---PDELISVDPHEVGCRFTLND
ConsensusE....L.....L.....E....D....G.....

GLRaV2-HSp90 VMNFMRLSNLDVNDKMLTEQCWSLSNSCGELINPDDKGRFVALTFKDRDTADDTGAANVECRVGD
BYV-HSP90 VTEFVKKINGNVAEPLSVEHCWSLSNSCGELINPKDTRFVSLIFKGKDLAESTDEAIVSSSYLD
BYSV-HSP90 VESFM----GGRASAAQVEHCWSLSNSCGELINPNDTARFIQLVFKDKAVTEQAAQ-VNTSGSVSD
CTV-HSP90 VESYLSMRGEDFADLAAVEHSWCLNSNSCGRLLSSTEIDAYKTLVFT--KNF--DSNVSGVTTKLET
Consensus V.....E..W.LSNSCG.L.....L.F.....

GLRaV2-HSp90 YLVYAMSLFEQRTQKSQSGNISLYEKYCEYIRTYLGSTDLFFTAPDRIPLLTGILYDFCKEYNVF
BYV-HSP90 YLSHCLNLYETCNLSSNSGKSLYDEFLKHVIDYLENSDLEYRSPDNPLVAGILYDMCFEYNTL
BYSV-HSP90 YLVYCLQLYDNSKKKSNAAGRTQLMESYVSFIRDFFQHSDLYRSPLDNPLLTGVLVYDLCEHNVL
CTV-HSP90 YLSYICISLYKKHCKMKDD-DYFNILILPMFNCMLKVLASLGLFYEKHADNPLLTGMLIEFCLENKVY
Consensus YL.....L.....L.....L.....PL..G.L...

I

GLRaV2-HSp90 YSSYKRNVDNFRFFFLANYMPLISDVVFQWVKPAPDV----RLLFELSAAELTLEVPTLSLIDSQ
BYV-HSP90 KSTYLKNIESFDCFLSLYLPLLEVFMSMNWERPAPDV----RLLFELDAAELLKVPNTINMHDST
BYSV-HSP90 RGSYLKNLDNFRFLFKQTYLPMIDIDFYDWELYAPDE----RLLFPIDPYEIIKEVPTMSVIDAN
CTV-HSP90 YSTFKVNLNDNVRFLFKSKVLPVVLTV----WDISEPDDPMDERVLIPFDPDFVLDLPLKLNHDTM
ConsensusN.....F.....P.....W....PD....R.L.....P....D..

I II

GLRaV2-HSp90 VVVGHILRYVESYTSDDPAIDALEDKLEAILKSSNPRLSTAQLWVGFFCYGERTAQSRVVQRP
BYV-HSP90 FLYKNKLYLESYFEDDSNELIKVKVDSLTRDNPELKLAQRWVGFCYGVFRTAQTRKVKRDA
BYSV-HSP90 VVLSNKLVLDSYLENNSILALEKKIISILCRDNEGIDEGALWAAFFCYGTYRTARQVRVVRPD
CTV-HSP90 VVVGNIQIRLEYVVEDDALDDLQHVLDLRLAADNPDLRVGLRWAGMFVYGVYRCVVDRAVERPT
ConsensusL...N.....W....YVG..R....R.V.R..

II

GLRaV2-HSp90 VYKTPDSV-----GGFEINMKDVEKFFDKLQRELPNVSLRRQFNGARAHEAFKIFKNGNISFRP
BYV-HSP90 EYKLPPAL-----GEFVINMSGVEEFFEELQKKMPSISVRRRRCGSLSHEAFSVFKRFGVGFPP
BYSV-HSP90 TYELDGIF-----SKPIV-MSGVELFFDELQKRVPDVSLLRRRFNGAKAGEAITVFKKLGISFPP
CTV-HSP90 LFRLPQKLLSQDDGESCSLHMGSVLEALFNLVQKVNKDINVRQFMGRHSEVALRLYRNLGLRFPP
ConsensusM..VE..F...Q.....RR.F.G....A.....F.P

II

GLRaV2-HSp90 ISRLNVPREFWYLNIDYFRHANRSLGTEEEILNINISVDVRKLCARACN-----TLPSAKR
BYV-HSP90 ITRLNVPVKYSYLNVDYRHRVGRVLTQDELTLISNIEFDVAEMCCEREVALQAR--RAQRGEKP
BYSV-HSP90 ITRLNAPSKYSYLNIDYFKQANSGLTEPEKIILCNIAKDVMCAQRISSVKA-----KP
CTV-HSP90 ISSVRLPAHHGYLYVDYFKRVPDGAVTADELESRLQRLSSVDVMCKDRVSITPPFPNRLRRGSSR
Consensus I.....P....YL..D.....T..E...L.....V...C..R.....

GLRaV2-HSp90 FSKNHKSNIQSSRQERRIKDPLVVLKDTLYEFQHKRAGWGSRSTRDLGSRADHAKGSG.
BYV-HSP90 FQGWKGTKEISPHARSSIRVKKNNDSLLNILWKDVGARSQRRNLNPLHRK-----H
BYSV-HSP90 IAQRNG--EAINSAKIRTLPTNTLVRALEKCLLNQAPSWWNTTLTNLR
CTV-HSP90 TFRGRGARGASSRHSRDVATSGFNLPHYGRLY-----STS
Consensus

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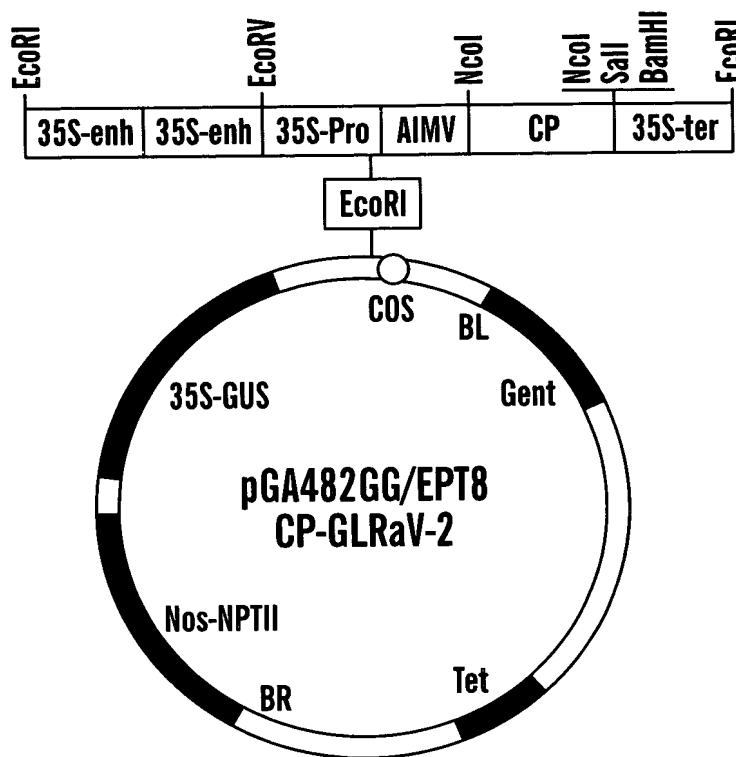


FIG. 11A

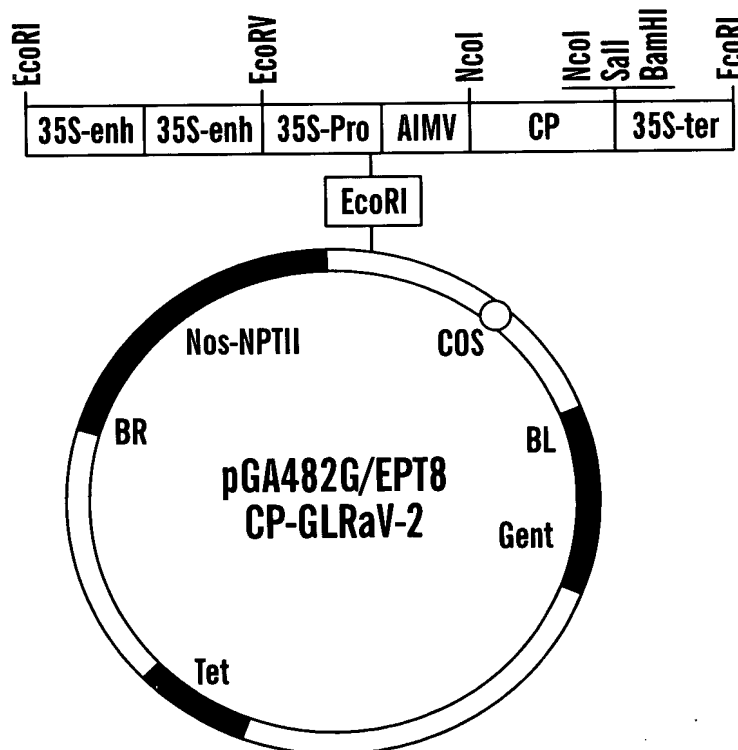


FIG. 11B

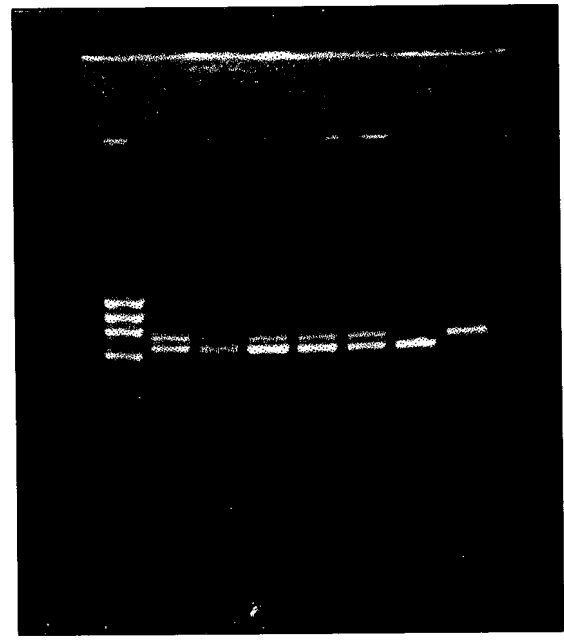


FIG. 12



Title: GRAPEVINE LEAFROLL VIRUS (TYPE 2)
PROTEINS AND THEIR USES
Applicant(s): Zhu, et al.
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FIG. 13



Title: GRAPEVINE LEAFROLL VIRUS (TYPE 2)
PROTEINS AND THEIR USES

Applicant(s): Zhu, et al.

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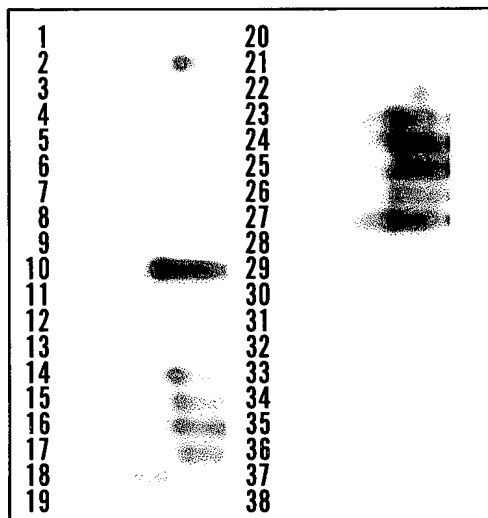


FIG. 14